Course guide
240IQU36 - 240IQU36 - Environmental Management Systems

Last modified: 16/05/2023

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: Rosa Maria Darbra Roman

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
3. Lead and manage work organization and human resources applying criteria of industrial safety, quality management, risk prevention, sustainability, and environmental management.
4. Manage and perform verification, control of facilities, processes and products, as well as certifications, audits, inspections, tests and reports.

Generical:
5. Possess independent learning skills to maintain and enhance the competencies of chemical engineering to enable the continued development of their profession.
6. Ability to analyze and synthesize to the continued progress of products, processes, systems and services using criteria of safety, affordability, quality and environmental management.

TEACHING METHODOLOGY

Lectures
Practical classes
Chemical Plants visits
Seminars
Independent learning
Learning through projects, problems and case-studies (team project)

LEARNING OBJECTIVES OF THE SUBJECT

This subject aims to introduce to the students to the topic of environmental management in the companies. In order to minimize the environmental impact, it is essential to carry out a proper management, for this reason this subject wants to get the student familiar with the steps to implement an environmental management system. In addition, quality and safety management systems will be also presented for their corporative importance, as well as the integration of the three systems.

At the end of this subject, the students will be able to:

1. Identify the most common environmental, quality and safety management systems as well as the methodology to implement them in any organization.
2. Determine the most suitable methodology for the quantification of the environmental impact of a given activity.
3. Appreciate the benefits obtained from the application of a quality management system in an organization or industry.
4. Identify the legal requirements that a company needs to know concerning the safety of their workers, installations and environment.
5. Get a global vision of the integration of threee management systems in one organization.

STUDY LOAD

Type	Hours	Percentage
Hours large group	40,5	36.00
Self study	72,0	64.00

Total learning time: 112.5 h

CONTENTS

Introduction to the Management Systems

Description:
In this first chapter, a global vision of the subject will be given together with a set of basic definitions that allow the understanding of the concepts that will be used in the forthcoming chapters.

Specific objectives:
Objectives from 1 to 5

Related activities:
There will be a 3 hours lecture and the students will have to read some papers and other documentation at home related to the introductory concepts.

Full-or-part-time: 9h
Theory classes: 3h
Self study : 6h

Environmental Management Systems

Description:
In this chapter different aspects related to the environment that affect companies, organizations and the society will be introduced. Different methodologies will be presented according to the scope of the activity (project, production process, and product).

Specific objectives:
Objectives 1 and 2

Related activities:
There will be 8 hours of lectures and one practical activity of 3 hours. In addition, the students will have to carry out some previous work to prepare the practical activity, then write the report of results obtained and finally, start to prepare the team project of the subject.

Full-or-part-time: 27h
Theory classes: 8h
Practical classes: 3h
Self study : 16h

Quality Management Systems

Description:
In this chapter, diverse methodologies that allow the companies to management the quality of the product or service are presented. Moreover, the benefits of certifying the quality management system will be also highlighted.

Specific objectives:
Objectives 1 and 3

Related activities:
There will be lectures for 3,5 hours of lectures. There will be also a visit (4hrs) to a chemical plant. As independent learning, the students will have to continue working on the final work, preparing the visit's report and personal study.

Full-or-part-time: 21h 30m
Theory classes: 7h 30m
Self study : 14h

Safety Management Systems

Description:
There will be a presentation of the safety management systems, highlighting their importance and the potential certifications such as ISO 45001 of Occupational Health and Safety.

Specific objectives:
Objectives 1 and 4

Related activities:
There will be a 4 hours lecture and then a practical class of 3hrs. There will also be an industry visit of 4 hours. The students will prepare the practical class report and proceed to finish the team project, the visit report and also devote some time to personal study.

Full-or-part-time: 27h
Theory classes: 8h
Practical classes: 3h
Self study : 16h

Integration of the three management systems

Description:
In this chapter, the synergies among the three management systems (environmental, quality and safety) will be presented. Moreover, it will be shown how the integration of all of them means an optimization of resources for the companies and organizations.

Specific objectives:
Objectives 1 and 5

Related activities:
There will be 3 hours of lectures and one seminar (2h) with an expert on this topic. After this, the students will present their team project final report (3 hours) in front of the rest of students. The students will have to prepare beforehand this presentation and also deliver the final team project.

Full-or-part-time: 28h
Theory classes: 8h
Self study : 20h

ACTIVITIES

PRACTICAL CLASSES

Description:
The practical classes will deliver complementary information and also reinforce the lectures in order to improve the knowledge of the students on the topic.

Specific objectives:
To apply the concepts and methods explained at class through practical exercises that allow the student to solve an applied activity.

Material:
Practical class documentation with guidelines, computers, report, etc.

Delivery:
Delivery of preliminary report and final report.

Full-or-part-time: 10h
Practical classes: 6h
Self study: 4h

VISITS

Description:
Visits to industries or organizations where the three management systems explained at class have been implemented.

Specific objectives:
To observe at first hand the implementation of the environmental, safety and quality management systems in a company. In addition, this visit will help the students to understand the importance of these systems and the benefit of their integration.

Material:
The one provided by the company.

Delivery:
Delivery of a visit report a week after the visit.

Full-or-part-time: 12h
Theory classes: 8h
Self study: 4h

FINAL TEAM PROJECT

Description:
The students will select one simple production process and they will have to implement one of the management systems studied at class (environmental, safety or quality).

Specific objectives:
To deal with a challenging situation as the one of implementing a management system in a company. The students will have to learn how to manage/implement/develop/assess a specific management system working in a team. After, they will have to communicate efficiently to the rest of the students the most significant results and the lessons learned during the team project.

Material:
Bibliographic research, computers, companies' visits, lecturers' tutorials, etc.

Delivery:
2 preliminar deliveries to follow the progress and a final delivery of the written final team project and an oral presentation.

Full-or-part-time: 33h
Theory classes: 3h
Self study: 30h

LECTURES

Description:
Explain the different topics of the subject.

Specific objectives:
Comply with those fixed in the subject.

Material:
Slides, exercises and papers. All is available at the atena platform.

Full-or-part-time: 57h 30m
Theory classes: 23h 30m
Self study: 34h

GRADING SYSTEM

Mid-term exam: 30% of the final qualification
Final exam: 30% of the final qualification
Team project: 20% of the final qualification
Practical classes: 15% of the final qualification
Visits report: 5% of the final qualification

The reevaluation will include only the two exams (mid-term and final). There will not be reevaluation of the team project, the practical classes and teh visits reports.

- The student will have to do at least one avaluation event to have a final qualification.

EXAMINATION RULES.

- Each exam is independent. The first one assesses the topics explained up to mid-term and the second one the rest until the end of the course. There is no a global exam of the subject.

- No material can be used in the exams.

- During the term, there will be different partial deliverables of the team project. In this way the professor can follow the progress.

- The practical classes are going to be done in class hours.

BIBLIOGRAPHY

Basic:
- Guia pràctica per a la implantació d'un sistema de gestió ambiental. Barcelona: Generalitat de Catalunya, 2000. ISBN 8439352816.
- Burriel Lluna, G. Sistema de gestión de riesgos laborales e industriales. 2a ed. Madrid: MAPFRE, S.A, 1999. ISBN 8471008319.
- CCPS. Guidelines for integrating process safety management, environment, safety, health, and quality [on line]. New York: AIChE, 1996 [Consultation: 28/09/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=588843. ISBN 128278322X.
- Hoyle, D. ISO 9000 quality systems handbook: using the standards as a framework for business improvement [on line]. 6th ed. Oxford: Butterworth-Heinemann, 2009 [Consultation: 27/09/2022]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=453025. ISBN 1280681675.
- Abril, C. ; Enríquez, A. ; Sánchez, J.M. Guia para la integración de sistemas de gestión : Calidad, Medio Ambiente y Seguridad y Salud en el Trabajo. 2a ed. Madrid: FC Editorial, 2012. ISBN 9788493961879.

Complementary:
- Edwards, A. J. ISO 14001 Environmental Certification Step by Step [on line]. Amsterdam: Elsevier Butterworth-Heinemann, 2004 [Consultation: 20/04/2023]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/book/9780750661003/iso-14001-environmental-certification-step-by-step. ISBN 9780750661003.
- Cuatrecasas, Lluís. Gestión integral de la calidad. Barcelona: Ediciones Gestión 2000, 2010. ISBN 9788496998520.
- Center for Chemical Process Safety. Guidelines for implementing process safety management systems.. New York: American Institute of Chemical Engineers, 1994. ISBN 0816905908.